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FIGURE H-1: YOUNGSTOWN OHIO CASE STUDY REGIONAL AREA

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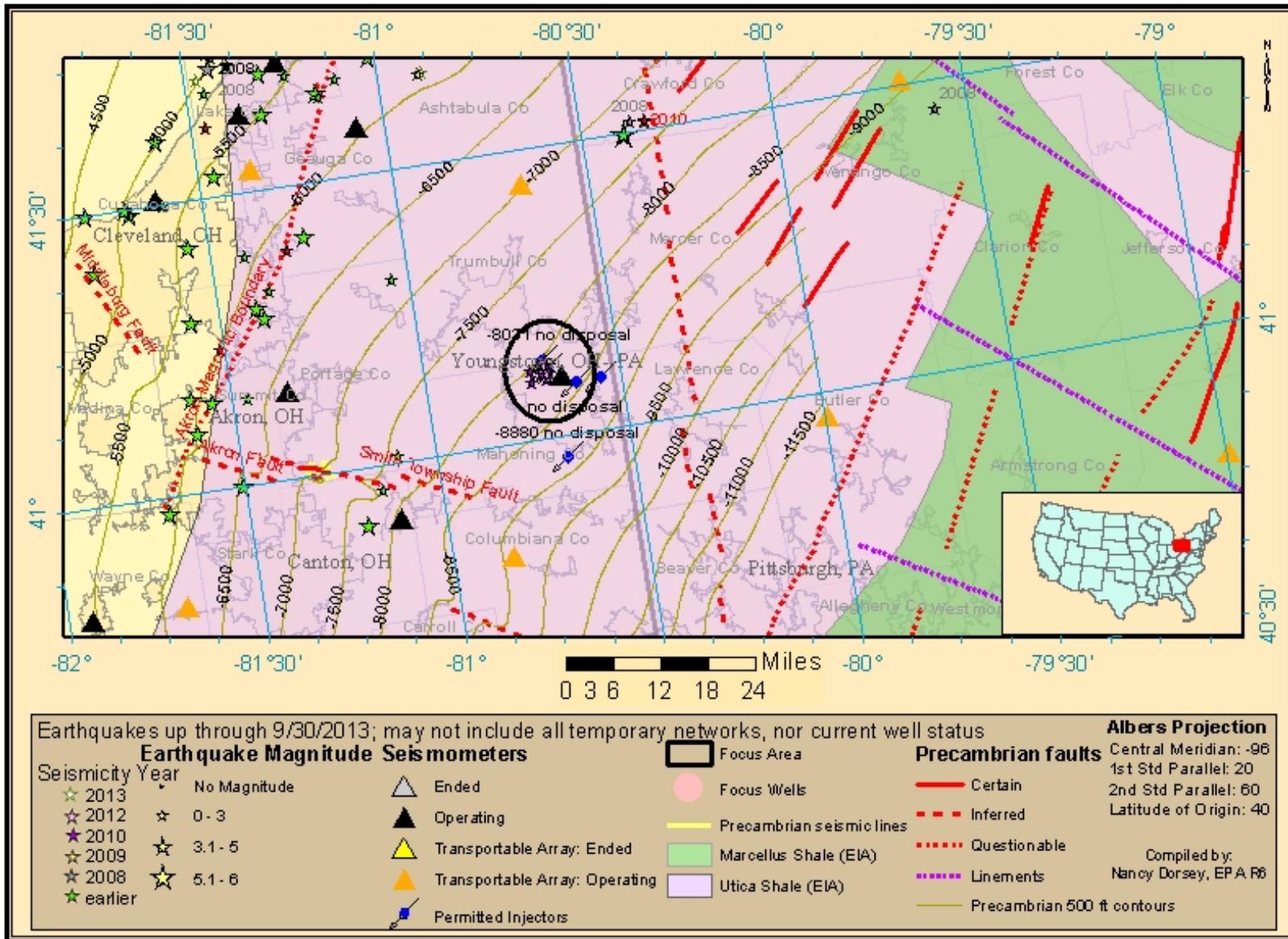
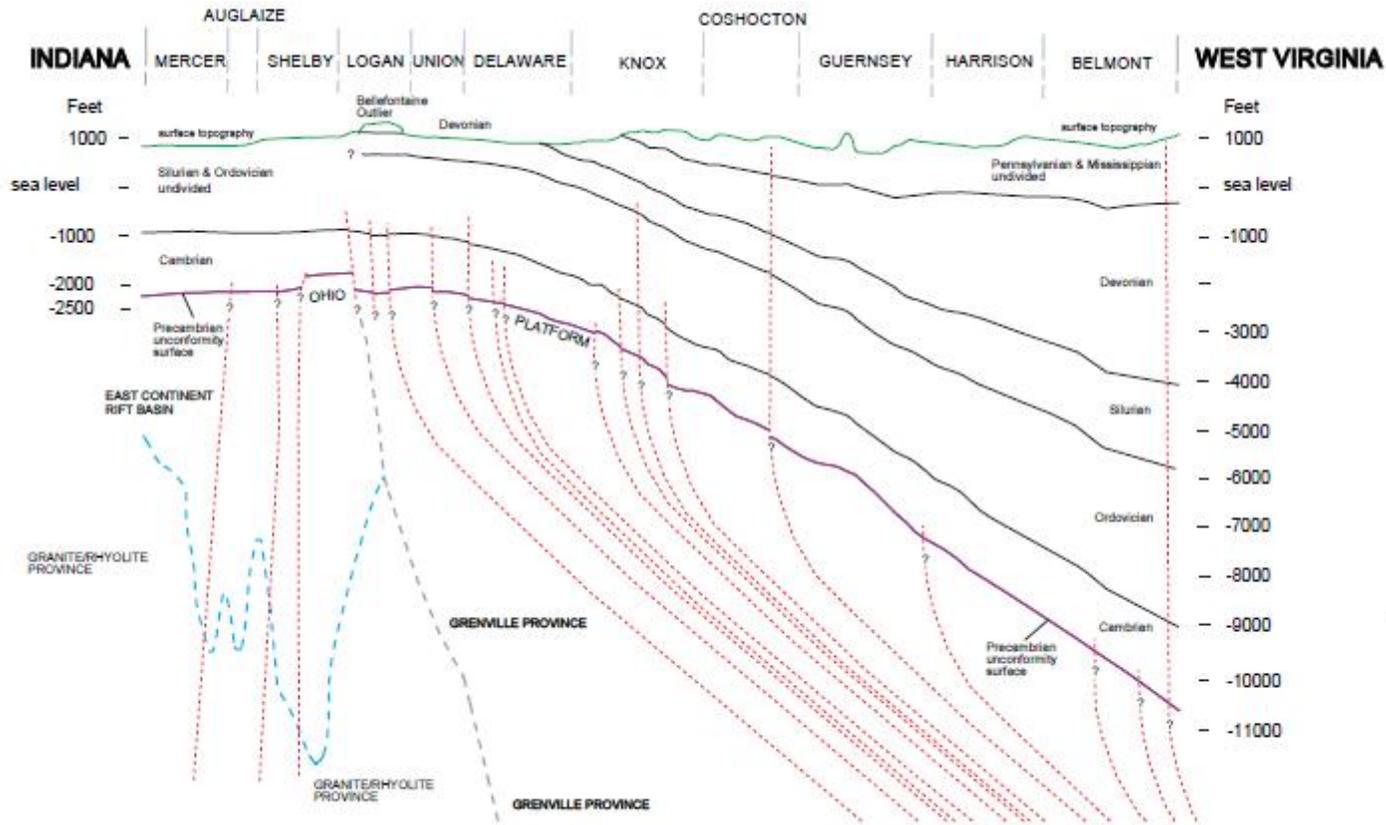


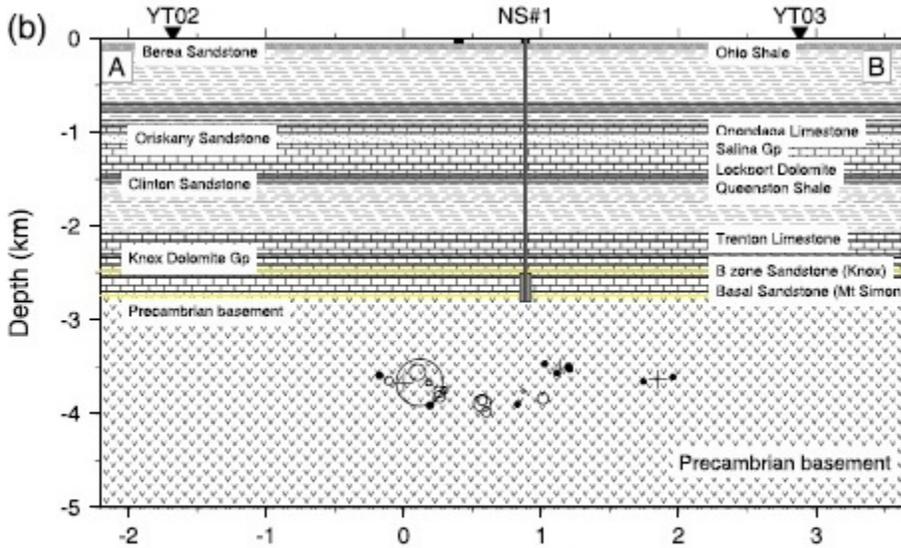
FIGURE H-2: REGIONAL CROSS-SECTION (BARANOSKI, 2002 WITH PERMISSION)



Datum = sea level. Vertical exaggeration = 50X.

Diagram based on interpretation approximately along COCORP OH-1 and OH-2 seismic lines.

FIGURE H 3: GENERALIZES STRATIGRAPHY AND EARTHQUAKE HYPOCENTERS (FIGURE 3B IN KIM, 2013 WITH PERMISSION)



Kim, W-Y (2013), Induced seismicity associated with fluid injection into a deep well in Youngstown, Ohio, *J. Geophys. Res. Solid Earth*, 118, Fig 3

FIGURE H- 4: UTICA AND MARCELLUS SHALE CROSS-SECTION (FIGURE 5A ON GEOLOGY.COM)

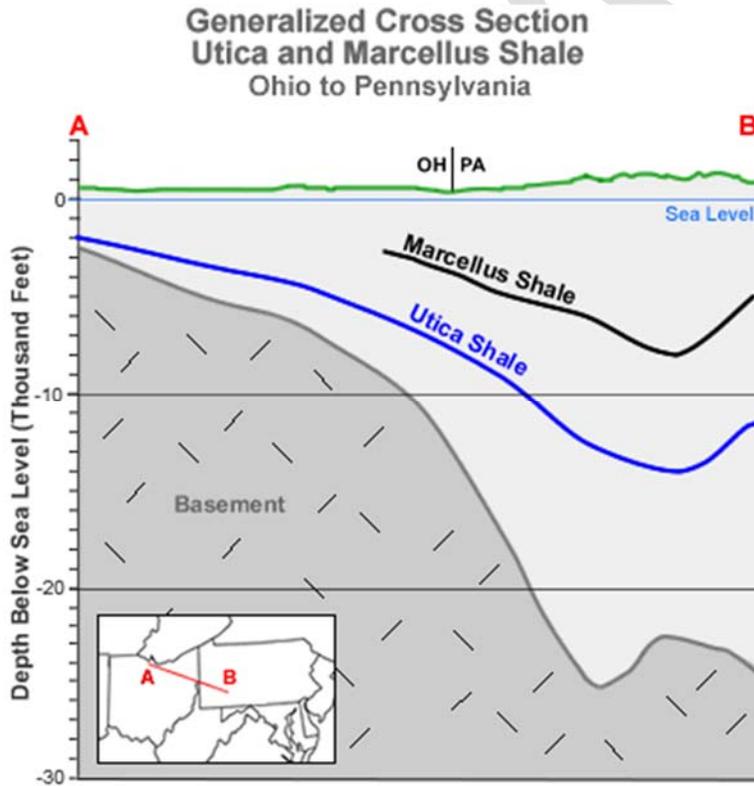


FIGURE H- 5: FOCUS AREA SEISMICTY MAP

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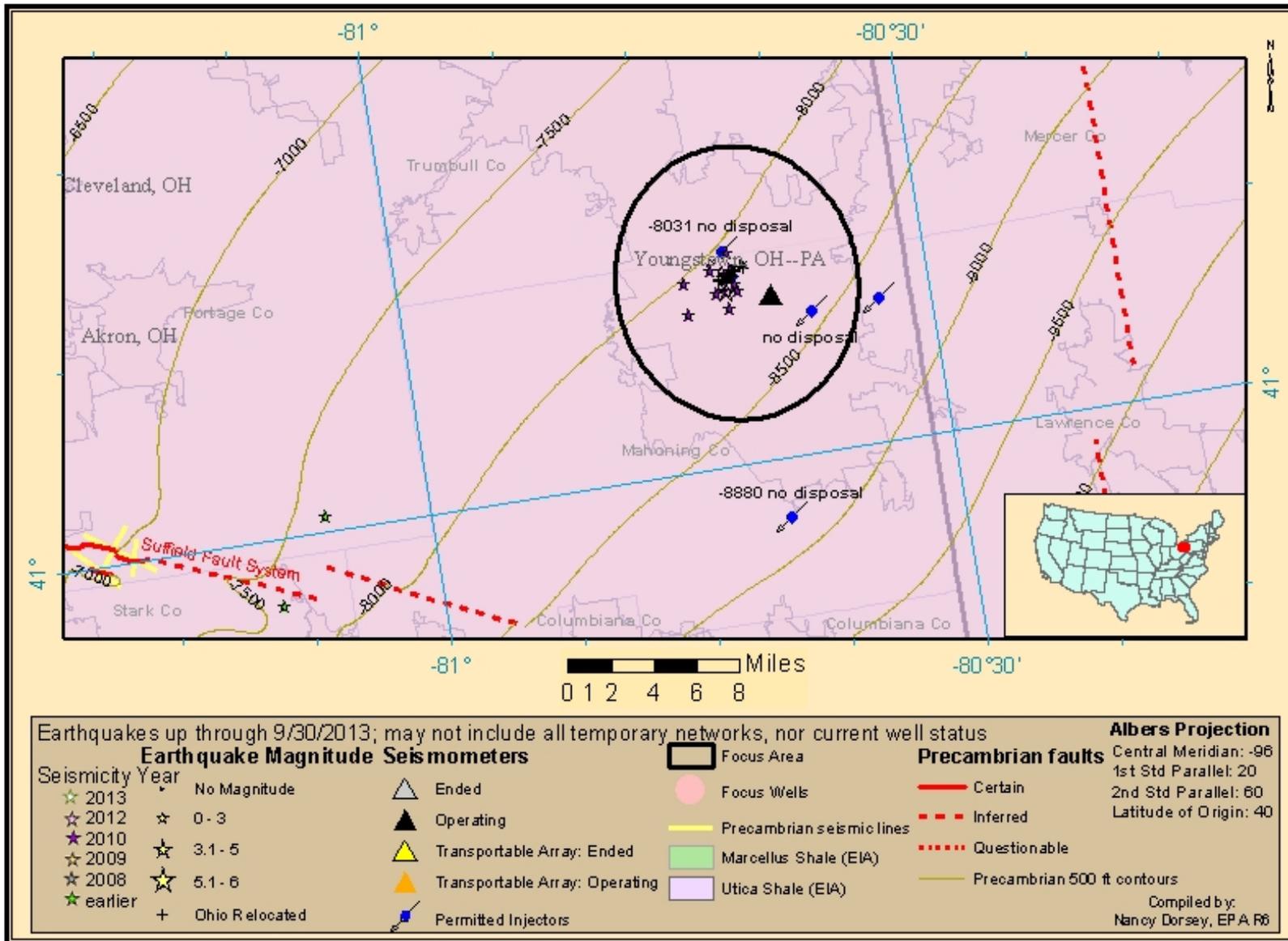


FIGURE H- 6: FOCUS AREA SEISMICITY TIMELINE

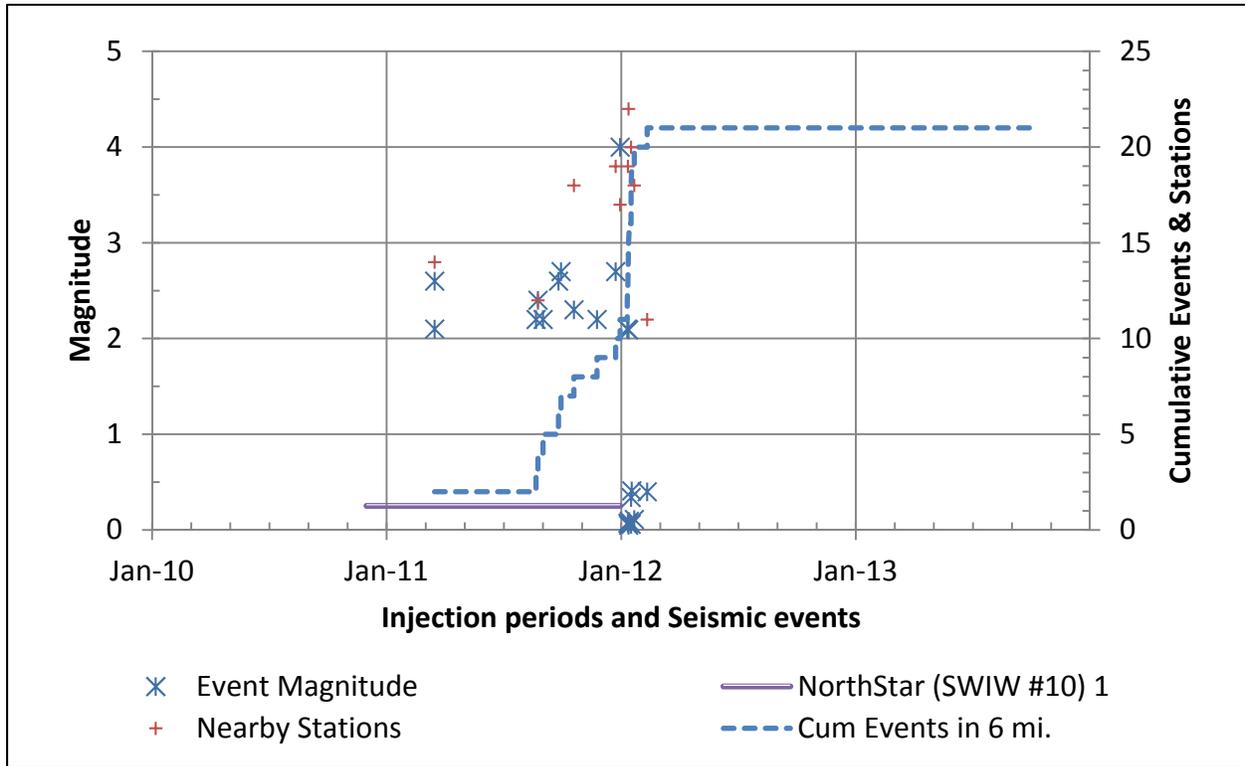
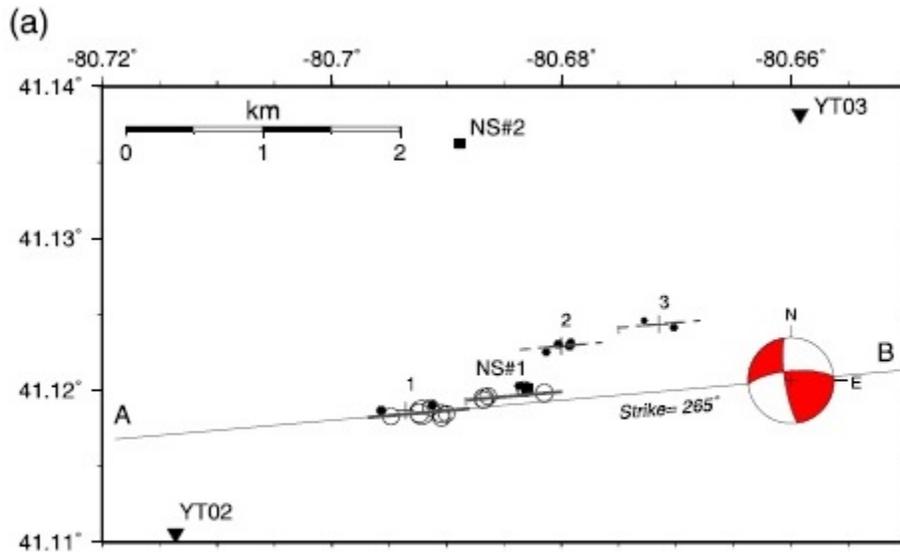


FIGURE H-7: RELOCATED SEISMICITY MAP (FIGURE 3A IN KIM, 2013 WITH PERMISSION)



Kim, W-Y (2013), Induced seismicity associated with fluid injection into a deep well in Youngstown, Ohio, *J. Geophys. Res. Solid Earth*, 118, Fig 3

FIGURE H-8: NORTHSTAR 1 OPERATIONAL DATA OVERVIEW PLOT

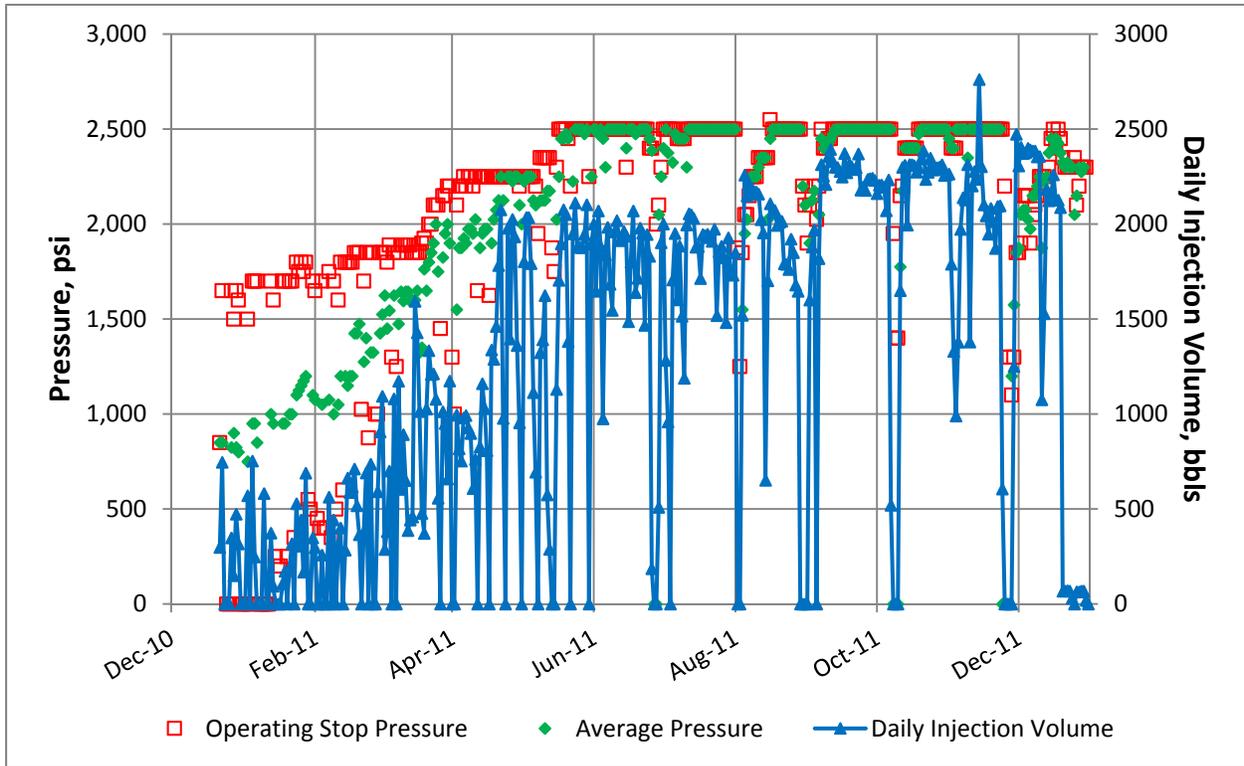


FIGURE H-9: NORTHSTAR 1 OPERATING PRESSURE GRADIENT PLOT

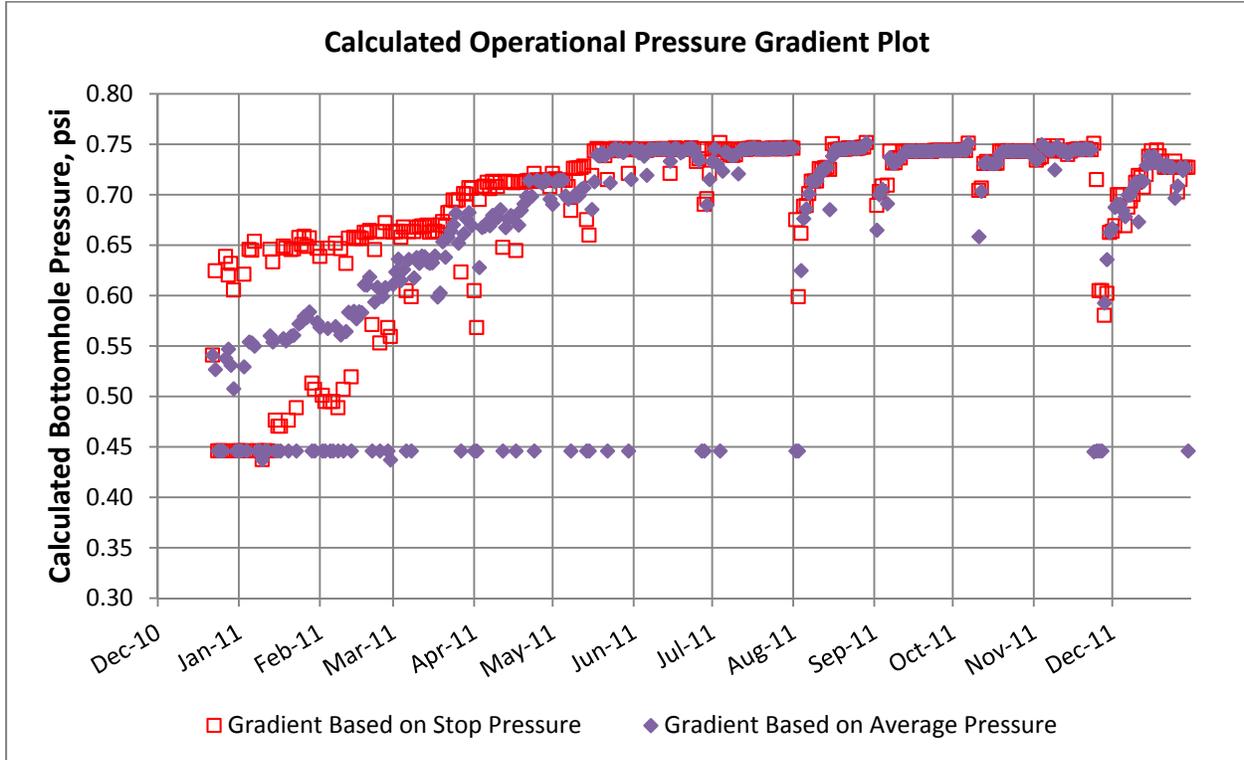


FIGURE H-10: NORTHSTAR 1 TANDEM PLOT OF CUMULATIVE EARTHQUAKES AND HALL INTEGRAL WITH DERIVATIVE

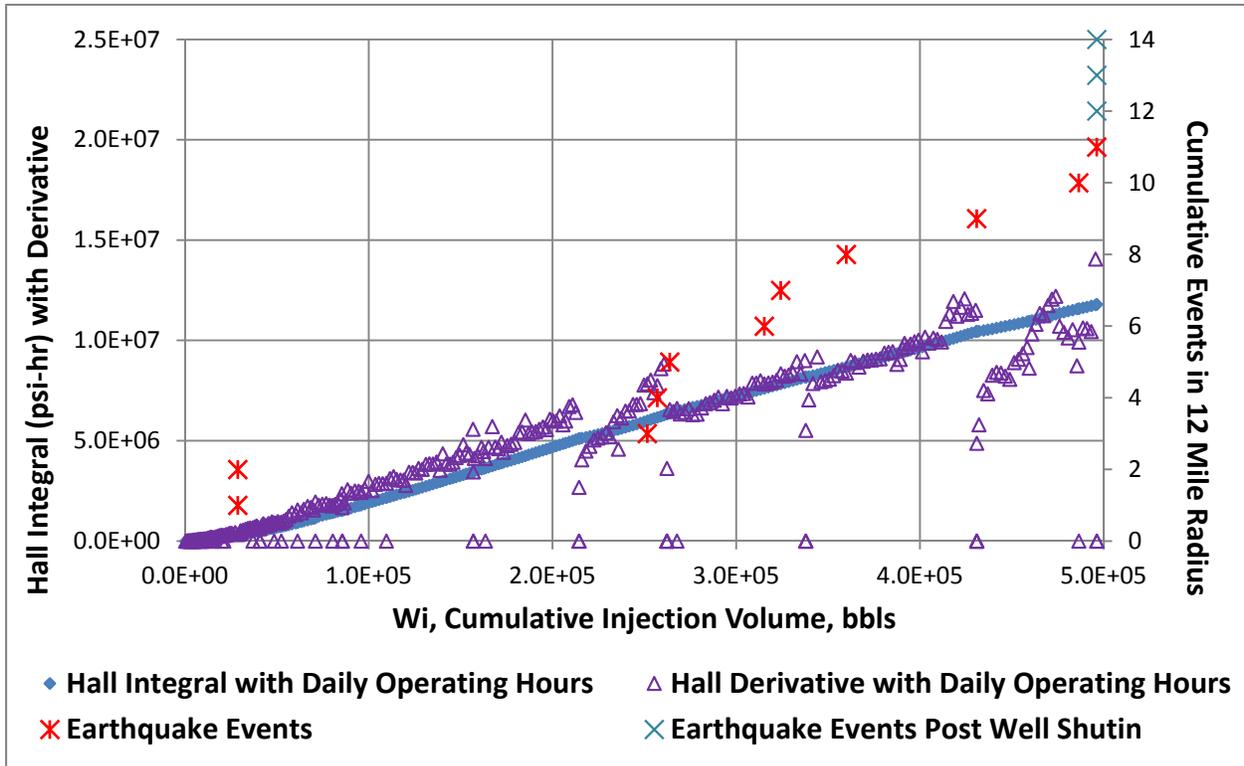


FIGURE H- 11: EXPANDED EARLY TIME TANDEM PLOT

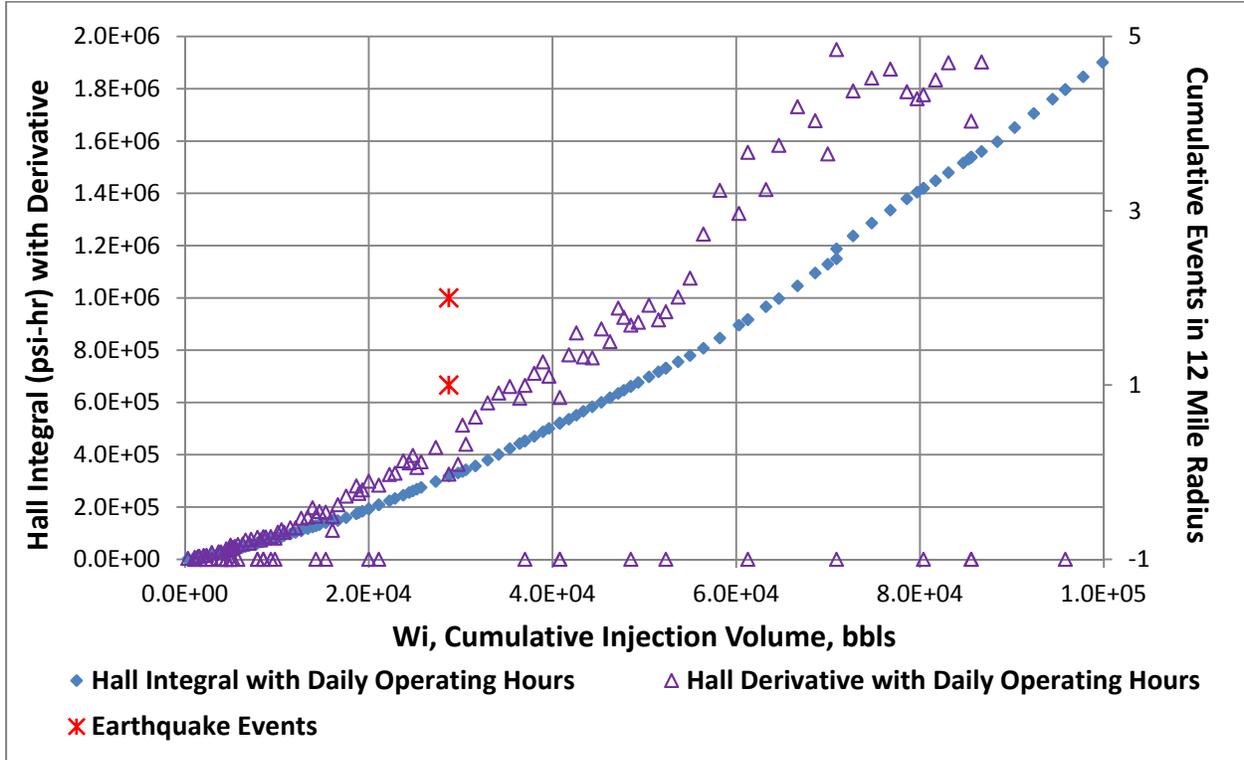


FIGURE H- 12: NORTHSTAR 1 JUNE 4, 2010 STEP RATE TEST

